# Appendix

## Financial and Economic Analysis

This section is a summary of the findings of a draft report by the Division of Agriculture, entitled Fish Creek Agricultural Area Financial and Economic Analysis. This summary is divided into two parts, a financial analysis and an economic analysis. The financial analysis examines the possible financial effects of farming in Fish Creek to the individual farmer. The economic analysis examines the economic effects on society as a whole by looking at the benefits and the costs of the project.

Financial Analysis

Assumptions. In developing this analysis, it was necessary to make several assumptions. The first and most basic assumption is that mixed crop farms are essential for development of viable agriculture at Fish Creek because: 1) mixed-crop farms allow more efficient utilization of equipment, 2) labor and weather constraints are more easily mitigated since in most years cultural and harvest activities for several crops can be spread throughout the season (a major caveat here is that the farmer must know the characteristics and requirements of his crops and the local weather patterns in order to make the best possible management decisions), and 3) market opportunities will be limited for high value and difficult-to-grow crops (such as vegetables and potatoes). Single-crop farms (e.g. barley or other grains) generally occur either on very large acreages in regions where the climatic "windows" during which each activity must be accomplished are bigger in most years than those that exist in Alaska, and/or where acquisition of as much equipment and/or labor as is needed is not a problem. In addition, the Fish Creek area is not topographically well-suited for very large farms.

A second assumption is that 1000 acres of potatoes will be grown at Fish Creek which by the year 2000 may be one-half of the acreage needed to meet in-state demand for potatoes; 150 acres of vegtables will be grown; and remaining agricultural soils will be planted in hay, grain or pasture.

A third assumption is the cost of the agricultural rights to the land. The figures below assume a cost of $100 per acre. Actual costs for state lands will be determined by an appraisal immediately prior to the sale. $100 per acre is estimated as the low end of the possible price range.

A fourth assumption is that everyone who purchases a parcel will be a serious farmer interested in getting his tract into production as quickly as possible. However, it is also assumed that one-third of the farmers will elect to harvest their timber and take advantage of the option to delay their agricultural development schedules three years, resulting in harvest of one-third of the timber on the tracts.

A fifth assumption is the mix of crops on farms of varying sizes. For purposes of this summary, the analyses of four sample farms and crop mixes are described. The farm names are those used in the longer report.

The following describes four hypothetical farms of varying sizes with different crop mixes. An analysis of the return from these farms forms the basis for the financial and economic analysis. The return is described as the internal rate of return (IRR) which is the average annual rate of return on the capital invested in the project over the period analyzed. The period used in this analysis is 47 years. The first farm (Farm Revision #1 in Div. of Agriculture's report) has 40 acres in potatoes and 40 acres in annual hay every year. Its IRR is 8.59 percent with potatoes at $10.00 per hundred pounds (cwt.) and 38.5 percent if potatoes are valued at $18.62 per cwt. Adjusting the land charge to reflect a borough land sale and setting the price of potatoes at $10.00 per cwt., the IRR becomes 7.44 percent. (The assumed borough land charge is based on prices paid for parcels of less than 100 acres in the October, 1982 borough land sale. The land charge used was $51.42 per acre during each of the first five years, $68.56 per acre in the sixth year, and zero after the sixth year).

The second farm (Farm Revision #3) is a mixed crop farm with 150 acres of hay, 80 acres of barley, 60 acres of potatoes, and 10 acres of vegetables. If potatoes are priced at $10.00 per cwt. the IRR is 17.17 percent; with potatoes priced at $18.62 per cwt. the IRR becomes 40.79 percent. If land charges are adjusted to reflect a borough land sale the IRR declines to 15.87 percent (assuming potatoes priced at $10.00 per cwt. and an annual land charge of $29.27 per acre for the first five years and $36.59 per acre in the sixth year).

The third farm, a 250 acre hay farm, shows a negative IRR over a 15 year period. However, if the period is extended to 20 years the rate of return becomes 2.5 percent. This farm model is believed to represent some of the development that will occur at Fish Creek because hay is a crop often favored by "part-time" farmers. It requires only seasonal work and a less costly combination of equipment than many other crops. Quality hay commands a premium price in Alaska, and the farmer has the option of expanding his enterprise to include cattle production. This is an ideal scenario for a person interested in pursuing his/her business interests elsewhere while building an equity and experience base in farming.

The fourth farm, a 600 acre farm with 350 acres in hay and 250 acres in barley (Farm Revision #2) has an IRR of 2.43 percent.

Although it cannot be expected that these arbitrary farm models represent the optimal combination of crops for profit maximization and efficient farm management, they do illustrate the fact that there are crop combinations that show farming as an attractive long-term investment.

Economic Analysis

Assumptions. Transferring the analysis from the farm level to the project level requires that assumptions be made as to the mix of sizes and types of farms that are likely to be developed at Fish Creek. It is assumed that no more than 1000 acres of potatoes will be produced at Fish Creek. By the year 2000, this might amount to one-half of Alaska'a total acreage in potatoes. Fish Creek farmers will have to be very competitive to achieve this share of the fresh potato market.

It is estimated that the market constraint on vegetables will limit Fish Creek farmers to a total of 300 acres. Development of a year-round vegetable industry--including a processing plant, storage, and vigorous marketing efforts--might allow vegetable acreage to increase. This limitation also is intended to reflect production restrictions due to the high labor costs and specialized knowledge and dedication that are required for successful vegetable farming.

Although there are many other specialized crops that can be produced in Alaska, little historical data is available. It is thus assumed that all land that is not used to produce potatoes or vegetables will be planted in hay, grain, or pasture. After the Fish Creek agricultural area is in full production, it is estimated that there will be approximately 12,800 acres of grass and grain hay and pasture, 2,550 acres of barley and other feed grains, 1000 acres of potatoes, and 150 acres of vegetables. For the purposes of this analysis, it is assumed that the Fish Creek agricultural area will have ten small farms with 80 acres in production (each with 40 acres of potatoes, 35 acres of annual hay, and 5 acres of vegetables), ten medium-sized farms with about 300 acres in production (each with 150 acres of hay, 80 acres of barley, 60 acres of potatoes, and 10 acres of vegetables), 34 250-acre hay farms, and 7 large farms of approximately 600 acres (each with 350 acres in hay and 250 acres in barley). This is a total of 61 farms. (This total is based on a draft version of the plan; the selected alternative has 55 farms; it is not expected that this would significantly alter the conclusions.)

Employment effect. Based on the labor factors for Alaskan agriculture (USDA, 1983) and the number of acres projected for each crop once full production is reached, total future employment (person years) for the Fish Creek agricultural area has been calculated at 41. If 60 percent of the annual working hours are available for seasonal work, then jobs for 68 seasonal employees can be anticipated.

Income effect. Based on the previously described development scenario, total net farm income in the fifth year is estimated at about $280,000, increasing to approximately $1.3 million in the eighth year, and $3.3 million for each of the eleventh through fifteenth years. Using the Alaska agricultural income multiplier of 1.873 (USDA 1983), the total income effect in each of the eleventh through fifteenth years of agricultural development at Fish Creek is estimated at approximately $6 million.

Benefit/cost analysis. Benefit/cost analysis is a commonly used method for determining the change in well-being which 'society as a whole' will experience due to a development project. The analysis evaluates both the costs and returns from the project over its life. Development projects typically require large capital improvements during the first few years followed by an often gradually increasing cash flow every year for many years. Benefit/cost analysis addresses the question of whether the cash flow that results from the project is large enough to rationalize investing the amount of capital that is needed at the outset.

Benefits are calculated as the sum of the gross receipts from farm production and the salvage value of equipment that is replaced. Transfer payments (the transfer of dollars from one section of society to another) are not included in the calculation of benefits because they do not contribute directly to

increased production. Loan receipts are transfer payments and are thus not included in the gross receipts from production.

Costs include both capital costs (off-farm and on-farm) and operating costs. The major off-farm capital expense is road construction which is estimated at approximately $19.2 million, based on figures supplied by the Matanuska-Susitna Borough. It is assumed that the access roads and phase 1 roads will be constructed in the year preceding the first year of farm development and that phase 2 roads will be constructed in the fifth year. Sixty percent of road construction and maintenance costs are allocated to agriculture in this analysis (sixty percent is an arbitrary figure; it is based on the assumption that other benefits will be gained from road construction, primarily recreational). On-farm capital costs are investment in farm buildings, land clearing, and equipment. Cost of land is not included because it is a transfer payment. Other costs include surveying, baseline studies, and administrative costs of sale preparation and monitoring.

Road maintenance is an annual expense and was estimated based on a factor of $8000 per mile, assuming approximately 54 miles of road (figures supplied by the Matanuska-Susitna Borough).

Benefits and costs were calculated for a 47 year period, and the net benefits (benefits minus costs) were calculated for each year. The overall average annual rate of return for the 47 year period is 9.47 percent. (This assumes that all project investment and operating costs have been recovered and that the project could in addition pay 9.47 percent annual interest for the use of the capital.) It would be advisable to do a sensitivity analysis, varying the assumptions, to check on the validity of the 9.47 percent figure.